



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No.FAA-2013-0819; Notice No. 25-13-06-SC]

Special Conditions: Bombardier Inc., Models BD-500-1A10 and BD-500-1A11 series airplanes; Fuselage In-Flight Fire Safety and Flammability Resistance.

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for the Bombardier Inc. Model BD-500-1A10 and BD-500-1A11 series airplanes. These airplanes will have a novel or unusual design feature associated with the materials used to fabricate the fuselage, which may affect fire propagation during an in-flight fire. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Send your comments on or before **[insert a date 45 days after date of publication in the Federal Register]**.

ADDRESSES: Send comments identified by docket number [FAA-2013-0819] using any of the following methods:

- Federal eRegulations Portal: Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

- Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 8 a.m. and 5 p.m., Monday through Friday, except federal holidays.
- Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

FOR FURTHER INFORMATION CONTACT: Alan Sinclair, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone 425-227-2195; facsimile 425-227-1232.

SUPPLEMENTARY INFORMATION:

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive on or before the closing date for comments.

We may change these special conditions based on the comments we receive.

Background

On December 10, 2009, Bombardier Inc. applied for a type certificate for their new Model BD-500-1A10 and BD-500-1A11 series airplanes. The Model BD-500-1A10 and BD-500-1A11 series airplanes are swept-wing monoplanes with pressurized cabins, and they share an identical supplier base and significant common design elements. The fuselages are aluminum alloy material, blended double-bubble design, sized for nominal 5 abreast seating. Each airplane's powerplant includes two under-wing Pratt and Whitney PW1524G ultra-high bypass, geared turbofan engines. Flight controls are fly-by-wire flight with two passive/uncoupled side sticks. Avionics include five landscape primary cockpit displays. The dimension of the airplanes encompasses a wingspan of 115 feet; a height of 37.75 feet; and a length of 114.75 feet for the Model BD-500-1A10 and 127 feet for the Model BD-500-1A11. Passenger capacity is designated as 110 for the Model BD-500-1A10 and 125 for the Model BD-500-1A11. Maximum takeoff weight is 131,000 pounds for the Model BD-500-1A10 and 144,000 pounds for the Model BD-500-1A11. Maximum takeoff thrust is 21,000 pounds for the Model BD-500-1A10 and 23,300 pounds for the Model BD-500-1A11. The range is 3,394 miles (5,463

kilometers) for both model airplanes. The maximum operating altitude is 41,000 feet for both model airplanes.

The Bombardier BD-500-1A10 and BD-500-1A11 series airplanes will be fabricated using aluminum-lithium materials. The performance of airplanes consisting of a conventional aluminum fuselage in an inaccessible in-flight fire scenario is understood based on service history and extensive intermediate and large-scale fire testing. The fuselage itself does not contribute to in-flight fire propagation. This may not be the case for an all-aluminum-lithium fuselage. Experience has shown that eliminating the fire propagation of the interior materials and insulation materials tends to increase survivability since other aspects of in-flight fire safety (e.g., toxic gas emission and smoke obscuration) are typically by-products of the propagating fire. The Bombardier BD-500-1A10 and BD-500-1A11 series airplanes must provide protection against an in-flight fire propagating along the surface of the fuselage.

Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Bombardier Inc. must show that the Model BD-500-1A10 and BD-500-1A11 series airplanes meet the applicable provisions of part 25 as amended by Amendments 25-1 through 25-129 thereto.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model BD-500-1A10 and BD-500-1A11 series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates

the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model BD-500-1A10 and BD-500-1A11 series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36 and the FAA must issue a finding of regulatory adequacy under § 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Model BD-500-1A10 and BD-500-1A11 series airplanes will incorporate the following novel or unusual design features: The fuselage will be fabricated using aluminum-lithium materials instead of conventional aluminum. This new type of material must provide protection against an in-flight fire propagating along the surface of the fuselage.

Discussion

The Bombardier BD-500-1A10 and BD-500-1A11 series airplanes will be fabricated using aluminum-lithium materials. The performance of airplanes consisting of a conventional aluminum fuselage in an inaccessible in-flight fire scenario is understood based on service history and extensive intermediate and large-scale fire testing. Experience has shown that eliminating the fire propagation of the interior materials and insulation materials tends to increase survivability since other aspects of in-flight fire safety (e.g., toxic gas emission and smoke obscuration) are typically by-products of the propagating fire. The fuselage itself does

not contribute to in-flight fire propagation. This may not be the case for an all-aluminum-lithium fuselage.

In the past, fatal in-flight fires have originated in inaccessible areas of the airplane where thermal/acoustic insulation located adjacent to the aluminum airplane skin has been the path for flame propagation and fire growth. Concern over the fire performance of thermal/acoustic insulation was initially raised by five incidents in the 1990's, which revealed unexpected flame spread along the insulation film that covered the thermal/acoustic insulation. In all cases, the ignition source was relatively modest and, in most cases, was electrical in origin (e.g., electrical short circuit, arcing caused by chafed wiring, ruptured ballast case).

In 1996, the FAA Technical Center began a program to develop new fire test criteria for insulation films directly relating to in-flight fire resistance. The current test standard at that time was evaluated as well as another small-scale test method that has been used by airplane manufacturers to evaluate flame propagation on thermal/acoustic insulation materials.

An inter-laboratory comparison of these methods revealed a number of deficiencies. A new test method subjecting a material to a pilot flame while the material is heated by a radiant panel was developed. The new radiant panel test method and criteria were specifically established to improve the evaluation of the in-flight fire ignition/flame propagation of thermal/acoustic insulation materials based on real-world fire scenarios. While these tests were developed for thermal/acoustic insulation materials, this same type of test methodology can be used to assess the flammability characteristics of the proposed aluminum-lithium material for the fuselage.

The FAA reviewed the test method proposed by Bombardier Inc. and determined that a larger flame and test article would be necessary to make a determination of the potential

flammability of the aluminum-lithium material. It would also be more representative of a real-life fire scenario.

The FAA recently conducted additional testing in our Components Fire Test facility and determined that another way to assess the survivability within the cabin of the Model BD-500-1A10 and BD-500-1A11 series is to use the cargo liner flammability test (part III of appendix F to part 25, *Test Method to Determine Flame Penetration Resistance of Cargo Compartment Liners*). However, the problem with using this particular test is that when the aluminum panels melt, molten globs of aluminum fall directly into the burner, which adversely affects the flame. So the FAA decided that a similar test for the measurement of insulation burnthrough resistance could be used (part VII of appendix F to part 25, *Test Method to Determine the Burnthrough Resistance of Thermal/Acoustic Insulation Materials*). Although this test method uses the same burner as the cargo liner test, it uses a slightly larger flame. In addition, the burner is not vertical, so there was no problem with molten material falling into it, requiring disassembly of the burner. The only slight change was the size of the sample and the sample holder. These were modified slightly to accommodate the samples that we received.

The recent FAA tests that were conducted in our Components Fire Test facility used a 6 gallon/hour oil burner, the same apparatus used to determine burnthrough resistance of thermal/acoustic insulation (part VII of appendix F to part 25). The test used 16 by 24 inch Al-Li panels that were installed into a sheet steel subframe, which measured 18 by 32 inches (outside dimensions). The subframe had an opening cut into it, which measured 14.5 by 22.5 inches; this allowed the test panels to be mounted onto the subframe using .250-20 UNC threaded bolts.

The FAA proposes that Bombardier use the test method contained in part VII of appendix F to part 25, *Test Method to Determine the Burnthrough Resistance of Thermal/Acoustic Insulation Materials*, with the slight changes to the sample size and sample holder as an alternate test method to show compliance with applicable requirements. Bombardier Inc. is responsible for finding a suitable testing facility in which to conduct the testing.

Applicability

As discussed above, these special conditions are applicable to the Model BD-500-1A10 and BD-500-1A11 airplanes. Should Bombardier Inc. apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on two models of airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Bombardier Inc. Model BD-500-1A10 and BD-500-1A11 series airplanes.

1. Fuselage In-Flight Fire Safety and Flammability Resistance. Bombardier must demonstrate that the fuselage would not materially contribute to the propagation of an in-flight fire or introduce any additional in-flight fire risk.
2. To demonstrate compliance, the test set-up and methodology must be commensurate with 14 CFR part 25, appendix F, part VII, except the size of the test samples, modifications to the sample holder, and the test methodology would be varied as described below.
3. In demonstrating that the aluminum-lithium material used to fabricate the fuselage has equal or better flammability resistance characteristics than the aluminum alloy sheet typically used as skin material on similar airplanes, the accepted test methods for compliance include:
 - a. Each test sample must consist of a flat test specimen. A set of three samples of the material must be tested. The size of each sample must be 16 inches by 24 inches by 0.063 inches.
 - b. The test samples must be installed into a steel sheet subframe with outside dimensions of 18 inches by 32 inches. The subframe must have an opening cut into it of 14.5 inches by 22.5 inches. The tests samples must be mounted onto the subframe using .250-20 UNC threaded bolts.
 - c. Test specimens must be conditioned at $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$ and 55 percent ± 5 percent humidity for at least 24 hours before testing.
4. Demonstration of compliance will be achieved if the material is not ignited during any of the tests.

Issued in Renton, Washington, on September 12, 2013.

/s/

Jeffrey E. Duven
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service

[FR Doc. 2013-25663 Filed 10/30/2013 at 8:45 am; Publication Date: 10/31/2013]